

**GENERAL**

The unit is manufactured, checked and supplied in accordance with our published specification and, when installed and used in normal or prescribed applications with the lid in place and within the parameters set for mechanical and electrical performance, will not cause danger or hazard to life or limb.

**HEALTH AND SAFETY AT WORK ACT 1974**

**WARNINGS**

1. THE USER'S ATTENTION IS DRAWN TO THE FACT THAT, WHEN THE UNIT IS 'LIVE' WITH RESPECT TO ELECTRICAL OR PRESSURE SUPPLIES, A HAZARD MAY EXIST IF THE UNIT IS OPENED OR DISMANTLED.
2. UNITS MUST BE SELECTED AND INSTALLED BY SUITABLY TRAINED AND QUALIFIED PERSONNEL IN ACCORDANCE WITH APPROPRIATE CODES OF PRACTICE SO THAT THE POSSIBILITY OF FAILURE RESULTING IN INJURY OR DAMAGE CAUSED BY MISUSE OR MISAPPLICATION IS AVOIDED.

**OPERATING PRINCIPLES**

Process pressure is sensed by a diaphragm that generates a force proportional to the applied pressure. This force is opposed by an adjustable spring that, at the point of equilibrium, permits movement of an operating rod which actuates a switch or switches.

**Note:** Should the diaphragm fail the process will vent to atmosphere via a control orifice without pressurising the switch enclosure.

**INSTALLATION**

The instrument is designed to be mounted vertically with the process connection underneath. However, mounting up to 45° from the vertical in any plane is acceptable, although a small calibration shift may occur. The instrument can be mounted either direct to process, or to a wall or panel, using the four mounting holes provided. Select the mounting point so as to avoid excessive shock, vibration or temperature fluctuation. Instruments should be mounted to avoid excessive heat transfer from the process lines or adjacent plant. To avoid undue stresses being imparted to the instrument when wall or panel mounted, it is recommended that a short length of flexible line be installed between the instrument and process line.

Take care to select and install adaptors to the electrical entry that do not reduce the enclosure degree of protection.

Use a spanner to support the process connection when fitting the instrument. When fitting the instrument lid, make sure the 'O' ring is in good condition and fitted correctly.

**References for Selection and Installation**

BS EN 60079-14:1997  
BS EN 60529:1992 IEC 529 IP RATING (Ingress Protection)

**Standards Applied to Product (Enclosure Code R)**

EN 50014:1997 + Amendments 1 and 2  
EN 50018:2000 CENELEC.  
EEx d IIC T6 @ II 2 G

**Temperature Classification (Enclosure Code R)**

T6 T<sub>amb</sub> -60°C to +65°C and T5 -60°C to +80°C.

**Product Code**

- **First Character: Enclosures**  
R - Stainless steel flameproof enclosure for use in Zone 1  
A - Stainless steel 'weatherproof'
- **Second and Third Characters: Type**  
VM - Type of Pressure Switch

**Installation of Electrical Adaptors and Cable Glands to the Electrical Entry**

Take care to select and install adaptors to the electrical entry that do not reduce the enclosure's degree of protection for use in Zone 1 Hazardous Areas. The product code at character 4 indicates the size and type of thread. The most common thread supplied is ISO M20 x 1.5. Other non-ISO and tapered threads will have the size and type stamped next to the entry.

**FAILURE TO OBSERVE THESE REQUIREMENTS WILL RENDER THE INSTALLATION UNSAFE!**

**Number of Entries**

The electrical entry is normally on the right hand side. Optional entry in the top may be supplied. On Enclosure Code R, cable entry holes are provided for the accommodation of ATEX certified flameproof cable entry devices, with or without interposition of a suitably certified flameproof thread adapter.

**Unused Entries (Enclosure Code R)**

Unused entries must be fitted with ATEX certified flameproof stopping plugs. Suitable flameproof cable entry devices, thread adaptors and stopping plugs certified as equipment (not a component) under an EC type examination certificate to directive 94/9/EC may also be used in the manner specified above.

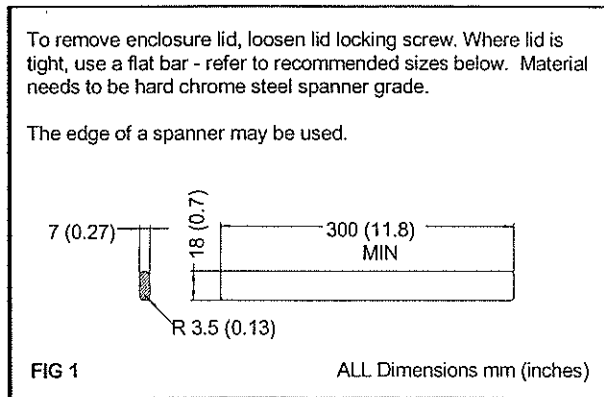
Alternative electrical entry threads that may be supplied to order: 1 electrical entry USAS B2.1 (1968) gauging to clauses 36 & 37 up to 1/2" NPT.

**WARNING FOR ENCLOSURE CODE R:** IT IS A SAFETY REQUIREMENT THAT AT LEAST 5 FULL THREADS ARE ENGAGED BETWEEN THE ADAPTOR AND CONDUIT ENTRY WHEN THE UNIT IS IN OPERATION. NEVER OPERATE THE UNIT UNLESS THIS CONDITION IS MET. ONLY USE GREASES OR LUBRICANTS WHICH ARE COMPATIBLE WITH THE ENVIRONMENT AND ENCLOSURE MATERIAL.

**Removing Cover/Lid**

The enclosure contains potentially sparking contacts so the cover/lid should never be removed while electrical power is connected to the switch and/or when a flammable gas is present.

Remove the cover/lid using an appropriate tool if tight, eg: edge of spanner or metal rod (Fig 1).



**Replacing Cover/Lid**

Thread, seal and contact surfaces may be lightly lubricated using a non-setting, non-corrosive grease compatible with the lid seal. Before connecting to electrical power, screw on cover/lid hand tight, making sure that mating surfaces of the lid and enclosure are in contact. Use the locking screw provided to prevent casual and unauthorised removal of the cover/lid.

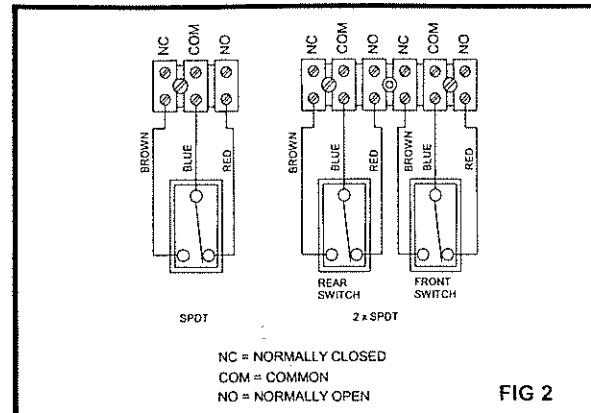
**End of Line Resistors (Enclosure Code R)**

Never fit end of line resistors or modify the product without reference to Delta Controls.

Only operation, maintenance or repair procedures, either contained herein or approved by Delta Controls, may be used to avoid rendering the equipment unsafe in operation and/or nullifying the Certification. NO MODIFICATIONS ARE PERMITTED.

Wire in accordance with local and National codes. Use cables no larger than 2.5 mm<sup>2</sup> (14 AWG). Deliver the electrical connection through a suitable cable gland which will maintain the IP rating of the instrument. Insert bare wires fully into the terminal block and tighten securely. Keep wiring tails to a minimum and check that wires do not interfere with the operating mechanism. Use the earthing/grounding points provided. See Fig 2 for wiring details.

**OPERATION**



Pressure switches are supplied calibrated against falling pressure unless otherwise specified. Set Point adjustment refers to falling pressure. Switching differential is the difference between the set point and the operating value on rising pressure.

**Set Point Adjustment: Models VM2/4**

1. Isolate the instrument from the process and power.
2. Loosen lid lock screw and remove the lid.
3. Retain in a safe place to avoid damage to threads.
4. Rotate the set point adjuster screw as required. Rotate clockwise to increase the set point and counter-clockwise to decrease the set point.
5. Replace the instrument lid (see Maintenance).

**Note:** For accurate setting, a suitable pressure gauge must be used in conjunction with the above procedure. Do not attempt to set the switch outside the scale limits. Though the unit may be set anywhere within its operating range, for optimum performance it is good practice to have a set point value between 25% and 75% of span.

**DECLARATION OF CONFORMITY**

**Description**

Flameproof Pressure, comprising a housing in cast stainless steel with an integral spring and venting chamber to which is attached a process sensor. Process changes applied to the sensor move a push rod, which passes through the enclosure wall to actuate one or two microswitches.

As the manufacturers of the apparatus, listed, we declare under our sole responsibility that the products listed below: Pressure switch series VM to which this declaration relates are in conformity with the following relevant harmonised standards:-

EN 50014:1997+Amds 1 & 2 EN 50018:2000  
EEx d IIC T6 @ II 2 G or EEx d IIC T4 @ II 2 G  
T6 T<sub>amb</sub> -60 degC to +40 degC and T4 -60 degC to +80 degC

Certified by the Electrical Equipment Certification Service Notified Body ITS Ltd in accordance with Article 9 of the Council Directive 94/9/EC.

**EC-TYPE EXAMINATION CERTIFICATE**  
**Nº ITS03ATEX11510X**

And thereby, conforms to the requirements of the ATEX Directive 94/9/EC.

Signed

R. Harmsorf  
Managing Director

20/5/2004

**SAFETY FACTORS THAT MAY AFFECT PRODUCT:**

| Potential Failure Mode               | Potential Effect of Failure  | Potential Cause(s) of Failure  | Recommended Action(s)   |
|--------------------------------------|--|--|---|
| Diaphragm failure                    | <ul style="list-style-type: none"> <li>• Switch does not respond to pressure change</li> <li>• Leakage of process medium into housing</li> <li>• Blow-out vent operates</li> </ul> | <ul style="list-style-type: none"> <li>• Over-pressured</li> <li>• Poor weld</li> <li>• Material defect</li> <li>• Incompatible process/wetted parts materials</li> <li>• Metal fatigue</li> </ul> | <ul style="list-style-type: none"> <li>• Ensure process pressure is within the switches limits</li> <li>• Ensure the wetted part materials of the switch are compatible with the process</li> <li>• Ensure the inst. rated lifespan of 100,000 operations is not exceeded (replace unit)</li> </ul> |
| Process connection weld failure      | <ul style="list-style-type: none"> <li>• Switch does not respond to pressure change</li> <li>• Leakage of process medium into housing</li> </ul>                                   | <ul style="list-style-type: none"> <li>• Incompatible process/wetted parts materials</li> <li>• Switch has been over-pressurised</li> </ul>  | <ul style="list-style-type: none"> <li>• Ensure process pressure is within the switches limits</li> <li>• Ensure the wetted part materials of the switch are compatible with the process</li> <li>• Ensure the inst. rated lifespan of 100,000 operations is not exceeded (replace unit)</li> </ul> |
| Microswitch failure                  | <ul style="list-style-type: none"> <li>• No electrical signal</li> </ul>   | <ul style="list-style-type: none"> <li>• Moisture ingress</li> <li>• Incorrect voltage applied</li> <li>• Mechanical failure</li> </ul>  | <ul style="list-style-type: none"> <li>• Check integrity of seals, glands etc</li> <li>• Check electrical ratings on switch label</li> <li>• Ensure the inst. rated lifespan of 100,000 operations is not exceeded (replace unit)</li> </ul>  |
| Seizure of mechanical assembly       | <ul style="list-style-type: none"> <li>• Switch won't operate</li> </ul>   | <ul style="list-style-type: none"> <li>• Moisture ingress leading to corrosion</li> </ul>  | <ul style="list-style-type: none"> <li>• Check integrity of seals, glands etc</li> <li>• (replace unit)</li> </ul>  |
| Process connection thread mismatched | <ul style="list-style-type: none"> <li>• Process medium leaks</li> <li>• Thread is visibly damaged</li> </ul>  | <ul style="list-style-type: none"> <li>• Incorrect fittings used</li> <li>• Care not taken when assembling process connection thread</li> </ul>  | <ul style="list-style-type: none"> <li>• Take care to only use correctly sized fittings</li> <li>• Ensure thread is not crossed during assembly (replace unit)</li> </ul>   |

## DIRECTIVES

The following Directives are also relevant to this product:

- **EMC Directive 89/336 amended by 93/68/EEC**

Not applicable to this product.

- **Pressure Equipment Directive (PED) 97/23/EC**

This product is a 'Pressure Accessory' as defined by the Pressure Equipment Directive 97/23/EC and the UK Pressure Equipment Regulations 1999. The connection size  $\leq$  DIN25 and is therefore manufactured to Sound Engineering Practice (Art.3 (3)) and is not CE marked. The product, however, will be CE marked for LVD or ATEX.

- **Low Voltage Directive (LVD) 72/23/EC amended by 93/68/EEC**

The product is in conformity with the following relevant standards or parts thereof.

**EN 60947-1:1992**

Low Voltage Switchgear and Controlgear – General Rules

**EN 60947-5-1:1992**

Low Voltage Switchgear and Controlgear – Devices and Switching Elements

**EN 60529:1991**

Specification for Classification of Degrees of Protection provided by Enclosures

**BS 6134:1991**

Specification for Pressure and Vacuum Switches

- **Intrinsic Safety**

Pressure switches neither store nor generate energy and can therefore be considered as 'intrinsically safe'.

## Installation, Operating and Maintenance Instructions

## Diaphragm Actuated Pressure Switch Series VM

## How can we help you?

Technical Datasheets and IOM Instructions for Delta Controls' pressure and temperature measurement products are available from our website at [www.delta-controls.com](http://www.delta-controls.com).

For Service and Repair enquiries, please contact the Switch, Transmitter or Temperature Sales Engineering Teams on +44 (0)20 8939 3500 or visit [www.delta-express.biz](http://www.delta-express.biz) to buy selected Switch spares kits on-line.